

REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

Upon entry of the foregoing amendments, claims 1-10 and 12-26 are pending in the application with claims 1, 4, 6, 7, 12, 18 and 25 being independent. Claims 1, 4, 6, 7, 12, 18-22 are amended. Claim 12 is canceled without prejudice or disclaimer. New claims 23-26 are added. These changes are believed to add no new matter, and their entry is respectfully requested.

If the Examiner believes, for any reason, that personal communication will expedite prosecution, the Examiner is invited to telephone the undersigned at the number provided.

Art Rejections

The claim rejections are traversed.

Claim 11 is canceled.

Claim 1

Claim 1 is amended to clarify the inventive combination of elements of the invention. None of the applied references teach or suggest the combination of features recited in amended claim 1. Exemplary support for the imaging/signal features recited in amended claim 1 can be found throughout the present application, and specifically at paragraphs 33, 34, 36 (1st sentence), 38, 39 (last sentence), 40 (1st, 2nd and 4th sentences), 42 (1st and last sentences), 43 (last two sentences), 45 (last sentence), 47, 49 (1st sentence), 50 (1st sentence), 52, 54, and original claim 7.

Kimura does not teach or suggest a system for satellite-based optical *imaging* applications as recited in claim 1. Kimura teaches/suggests only (i) point-to-point optical *inter-satellite communications* links, through which satellites inter-communicate (col. 5, lines 25-26), and (ii) *RF* links between satellites and ground stations for *speech or data* (FIG. 11,

col. 6, line 67). Kimura FIGs. 12 and 13 depict satellite apparatus only for transceiving the optical *cross-links* and down-linking the *RF* links/signals. Therefore, the Kimura apparatus is not configured for optical *image* collection, processing and displaying as recited in claim 1. Specifically, Kimura does not teach the following features recited in claim 1:

at least one surveillance aperture, on-board one of the plurality of OPTSATs, for optically imaging an object, wherein the surveillance aperture on-board the OPTSAT receives an optical signal representative of an optical image of the object;

It follows that the non-satellite terminals in Kimura (e.g., 35a, 36a and 31) are not capable of wirelessly transceiving information between the “terminal includ[ing] a display for displaying the optical image.” as is also recited in claim 1.

In addition, Kimura does not teach or suggest at least one image processor for processing the optical image obtained by the at least one satellite based surveillance aperture, as recited in claim 1.

The claim rejection rationale, listed on pages 1 and 2 of the Office Action, seems to infer that Kimura teaches or suggests object *imaging* features as applied to the optical satellites described in Kimura. Applicant can not identify any basis in Kimura for this inference. Kimura does not teach or suggest any such imaging.

Neither Margalit nor Dawson (alone or in combination) teaches or suggests any of the above mentioned features recited in claim 1. Therefore, the applied references, alone or in combination do not teach or suggest the invention recited in claim 1.

All of the claims depending from claim 1 directly or indirectly are patentable for at least all of the same reasons claim 1 is patentable.

Claim 3

Neither Margalit nor Kimura motivate or suggest to one of skill in the art to shoe-horn into the optical satellite described in Kimura the terrestrial-based optical components described in Margalit, in order to reconstruct the invention recited in claim 3. See, e.g.,

Margalit, Abstract, first sentence, placing Margalit's optical components only on *buildings*; See, also, col. 2, lines 5-12; col. 5, lines 60-63. Dawson does not cure any of the deficiencies of Margalit or Kimura with respect to claim 3. Moreover, each of Margalit and Kimura teach optical communications, not *imaging*. Therefore, assuming arguendo the Margalit-Kimura combination suggested by the Examiner could be made properly, which Applicant asserts it can not, the result would not teach or suggest any of the *imaging* features recited in base claim 1. Applicant respectfully submits that a rejection of claim 3 based on combining Margalit, Kimura and Dawson requires impermissible hindsight-based picking and choosing of features, as convenient, from the applied references to reconstruct the invention.

Claim 4

Claim 4 is rewritten in independent form to include all of the features of amended base claim 1 and all of the intervening claims. Claim 4 is patentable for at least all of the same reasons advanced above for the patentability of claim 3. In addition, claim 4 recites the feature of "at least one transmit amplifier for amplifying optical signals prior to transmission when utilizing a LADAR on-board the OPTSAT." A "LADAR" is a laser radar, which, as is understood by one of skill in the art, operates to transmit a laser signal at a target and receive the resulting laser echo/reflection back from the target. None of the applied references teach or suggest a laser radar.

The rejection rationale in paragraph 4 of the Office Action cites Kimura, col. 9, lines 43-48 and col. 15, lines 11-17, as suggesting a LADAR. Applicant has reviewed Kimura carefully and can not identify any reference to laser radar or LADAR, or any apparatus that performs as a LADAR. Therefore, Applicant respectfully submits that nowhere in Kimura is there disclosed or suggested any reference to a LADAR as recited in claim 4. If the rejection of claim 4 is maintained, then Applicant respectfully requests further explanation from the Examiner as to how Kimura teaches or suggests a laser radar/LADAR as recited in claim 4.

Thus, none of the applied references, alone or in combination, teaches or suggests a LADAR, a LADAR on-board a satellite, or a LADAR on-board a satellite in combination with all of the other elements recited in claim 4.

Claim 5

Neither Tsushima nor Kimura motivate or suggest to one of skill in the art to shoe-horn the optical components described in Tsushima into the optical satellite described in Kimura, in order to reconstruct the invention recited in claim 5. Moreover, the Tsushima-Kimura combination suggested by the Examiner would not teach or suggest any of the optical imaging features from claim 1. Applicant respectfully submits that a rejection of claim 5 based on Tsushima and Kimura requires impermissible hindsight-based picking and choosing of features, as convenient, from the applied references to reconstruct the invention.

Claim 6

Claim 6 is rewritten in independent form to include all of the features of amended base claim 1 and all intervening claims. In addition, claim 6 recites the original feature of “at least one transmit amplifier for amplifying optical signals prior to transmission when utilizing a LADAR on-board the OPTSAT.” None of the applied references teach or suggest a LADAR (see Applicant Remarks above in connection with claim 4), let alone a LADAR on-board a satellite, and in combination with all of the other elements recited in claim 6.

Claim 7

Claim 7 is rewritten in independent form to include all of the features of *original* (not amended) base claim 1 (but, amended slightly to recite that the surveillance aperture is *on-board* an OPTSAT) and *original* intervening claims 2 and 5, but NOT the features of original intervening claim 6 (i.e., the LADAR feature recited in claim 6). That is, claim 7 includes all of the feature of *original* claims 1, 2 and 5, but not claim 6.

Claim 7 recites the further feature that the switch bank on-board the OPTSAT includes optical switches that are *switched to control*

(i) *transmission directions of free-space optical signals* through the surveillance aperture, and

(ii) *receiving directions of free-space optical signals* (through the surveillance aperture).

While Kimura teaches optical inter-satellite beams, Kimura does not teach or suggest any method or apparatus directed to *directional control of the optical inter-satellite beams*. Tsushima does not teach or suggest the use of the disclosed optical switches to *switch the directions of free-space optical signals in transmit or receive directions* in the manner recited in claim 7. Instead, Tsushima teaches a LAN including an optical switch bank that merely selectively routes different wavelengths to a multiplexer 23 used in the LAN. Therefore, one of ordinary skill would not have been motivated by the applied references (either Kimura or Tsushima) to use the switch bank of Tsushima for a completely different purpose than that taught by Tsushima, i.e., to *switch the directions of free-space optical signals through a satellite aperture* in either transmit or receive directions as is recited in claim 7. Applicant respectfully submits that neither Kimura nor Tsushima, alone or in combination, teaches or suggests optical switches that are *switched to control transmission and reception directions of free-space optical signals through a satellite aperture*, as recited in claim 7.

Claim 8

None of the applied references, alone or in combination, teach or suggest an image processor on-board a satellite, as recited in claim 8. Applicant can not identify in any of the applied references an “image processor,” i.e., a processor that processes images.”

Claim 11

None of the applied references, alone or in combination, teach or suggest an image processor as recited in claim 11. Applicant can not identify and “image processor,” i.e., a processor that processes images, in any of the applied references.

Claim 12

Claim 12, amended similarly to claim 1, recites in part:

imaging an object with at least one surveillance aperture ~~operatively linked to on board~~ at least one of the plurality of OPTSATs, including receiving an optical signal representative of an optical image of the object at the at least one OPTSAT;

processing the optical image ~~data~~ obtained by the at least one surveillance aperture in at least one image processor . . .

Claim 12 is patentable for at least the reasons advanced above for the patentability of claim 1.

All of claims depending from claim 12 are patentable for at least all of the same reasons claim 12 is patentable.

Claim 14

Claim 14 is patentable for at least the same reasons advanced above for the patentability of claim 8.

Claims 18-22

Applicant respectfully submits that the claim rejections in the Office Action do not address each of the method steps recited in claim 18. None of the applied references disclose or suggest the method steps of claim 18 directed to imaging using an optical satellite. Also, the rejections do not address the additional steps recited in claims 19-22. The applied references alone or in combination do not teach or suggest the additional steps recited in each of claims 19-22.

New Claim 23

Exemplary support for this claim can be found in the present application at FIGs. 5 and 6, paragraphs 25, 32, 48, 49 and 50. As recited in the claim, the optical satellite down-links optical signals (carrying an optical image) at a wavelength suitable for optical fiber transmission. None of the applied references teach or suggest these features.

New Claim 24

New claim 24 depends from claim 7 and recites the LADAR feature similarly recited at the end of claim 6. New claim 24 is patentable for at least all of the reasons advanced above for the patentability of the LADAR feature in claim 4.

New Claim 25

Claim 25 recites a system including a LADAR-based optical satellite, including optical beam steering components, for acquiring an optical image of an object, down-linking the optical image, and a terminal to display the down-linked image. Claim 25 is reproduced below with *exemplary* cites, to elements depicted in the figures of the present application, for support:

Claim 25 (new): A system for optically imaging one or more terrestrial-based or airborne objects, comprising:

- a laser radar (LADAR) equipped optical satellite (100), comprising:
 - an optical aperture (610) for transceiving free-space optical signals; and
 - a multiple beam optical array transceiver (502), comprising:
 - an optical beam steering controller configured to issue optical beam steering commands;
 - an optical amplifier bank (602) including transmit amplifiers (603) and receive amplifiers (604);
 - an optical beam steering mechanism (MEMS 609 or optical switches 701) optically coupled between the optical amplifier bank (602) and the optical aperture (610), including beam steering components (MEMS mirrors, or switch banks) that are configured, responsive to the beam steering commands, to
 - (i) receive optical signals from the transmit amplifiers, and direct the optical signals through the optical aperture (610) in desired directions toward the one or more objects in order to image the one or more objects, and
 - (ii) receive optical signals through the aperture (610) from the desired directions corresponding to the one or more objects, and pass the received optical signals to the receive amplifiers, wherein the received optical signals represent optical images of the one or more objects; and
 - a converter (FIGs. 6 & 7) configured to convert the received optical signals representing the optical images to an optical wavelength suitable for optical fiber transmission,
 - wherein the multiple beam optical array transceiver and optical aperture are configured to down-link the optical wavelength; and
 - a terrestrial-based (110, 102) or airborne (103) terminal configured to receive the down-linked optical wavelength, recover the optical images of the one or more objects from the optical wavelength, and display the recovered optical images.

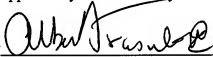
Information Disclosure Statement (IDS)

Applicant requests that the Examiner acknowledge a review of each of the references listed in the IDS filed herewith.

Conclusion

On the basis of the above amendments and remarks, reconsideration and allowance of this application are believed warranted.

THE JOHNS HOPKINS UNIVERSITY
Applied Physics Laboratory

By 

Albert J. Fasulo, II
Reg. No. 43,607
Tel.: (240) 228-5639